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EUROPEAN AND AMERICAN METHODS OF RAT CONTROL

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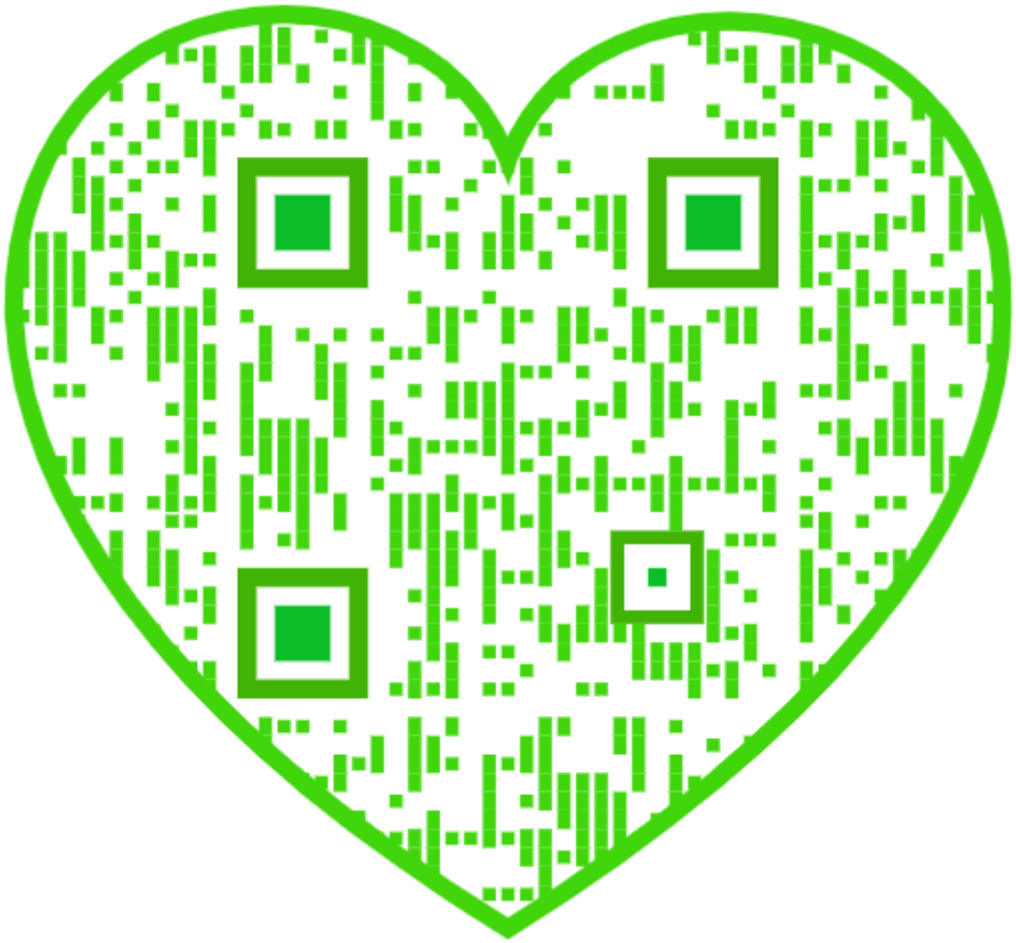
The world's worst mammal pest, the brown rat (Rattus norvegicus), was not introduced into the American colonies until 1775. European countries, therefore, have had many more years of experience in combating this rodent than has the United States. An account of methods of control used in Europe, gathered from conferences with authorities in several countries, should aid in solving the control problem in this country. From a first-hand study of the situation, it seems fair to say that those nations that have passed rat-control laws have been much more successful in reducing the numbers of rats than have those with no legislation and no definite program on the subject.

METHODS IN EUROPE

Denmark

Denmark, which is about half the size of South Carolina, was the first country to attempt to solve the rat problem on a nation-wide basis. In 1898, Emil Zuschlag, a sanitary engineer, made an address to stimulate interest in a national law that would provide funds for the systematic destruction of rats. His address led to the organization of a society of 2,000 members to demonstrate his methods. During 18 weeks of the following year 100,000 rats were caught in Copenhagen and Fredericksberg.



In 1907 the losses occasioned by rats in Denmark were estimated at $3,000,000. In that year, as a result of Mr. Zuschlag's efforts, the first Danish law relating to rat control was passed. It provided a State grant of 30,000 kroner (about $8,000) annually and stipulated that the fund was to be used (1) to pay a bounty, through local authorities, for rats killed; (2) to permit experiments by the Royal Veterinary and Agricultural College; and (3) to purchase supplies for the campaign of extermination. In three years 3,887,278 of the rodents were destroyed at a cost of half a million kroner (about $134,000), or 13 öre (3.5 cents) for each animal killed. Amendments to the law were made from time to time until 1924, when new legislation was passed.

The new law stipulated that municipalities should undertake rat-control campaigns at least once a year. Local authorities either financed the campaigns with municipal taxes, supplemented by State funds, or compelled property owners to take the necessary action. Fines were imposed for noncompliance. Only rat poisons certified by the Royal Veterinary and Agricultural College could be used. On the approved list were 1 bacterial and 12 squill preparations. Other poisons could be used, but with certain restrictions. The bounty system legalized in 1907 was made optional.

Mr. Zuschlag believes that the 1924 legislation, which is still in force, is good, but not good enough, as rural families are not compelled to participate in the program. In his opinion the bounty system was good at the start but is no longer a satisfactory control measure. He feels that there is need for more publicity, and that regulations should be adopted making the ratproofing of buildings compulsory. The writings of David E. Lantz, formerly of the Bureau of Biological Survey, have been an important influence in that direction in Denmark.

The Danish health authorities do not underestimate the relation of rats to human health. A dozen cases of infectious jaundice have been recorded in the country during the last 2 or 3 years, the first time this disease has appeared there.

As a result of operations under the control legislation, it is claimed that there are now few rats in Denmark. Possibly much of this condition may be attributed to the nature of the people, who keep their premises in such a sanitary condition that the animals cannot get a foothold. Denmark has been very successful in rat control.

England

England, too, has contributed much toward the solution of the rat problem. The first control regulations were the Rat Orders of 1918 and 1919, necessitated by war conditions, under which the local authorities paid bounties on rats. These orders were superseded by permanent legislation passed in December 1919, and effective January 1920. The new law was known as the Rat and Mouse (Destruction) Act.

This legislation recognized national responsibility for control, but placed the burden of destroying rats upon the occupier of land, and prescribed fines for noncompliance. Execution of the act was placed in the hands of local authorities (600 in all) within whose jurisdictions infested premises were situated and also in the Ministry of Agriculture, which may enforce the act in case of failure of a local authority. Among other interesting details was the provision permitting agents of a local authority to enter the land of the occupier to undertake necessary measures for extermination and to organize collective action where desirable.

It soon became apparent that the 1919 legislation had many defects. The principal one was that it did not make the owner as well as the occupier responsible for rat elimination. The owner should have been held responsible because these rodents are most commonly found in the poorer sections of the city or country, and the tenants cannot afford control. The act did not clearly state on whom the financial burden was to be placed. Despite defects, however, it is generally thought that the legislation has been helpful in providing a plan of cooperation for combating the pest on a national basis.

A technical adviser of the Ministry of Agriculture was appointed to do research work and to disseminate information on the best methods of control. One of the better-known plans devised by the Ministry is that for "National Rat Week." The purposes of Rat Week, which is observed annually in November, are to remind the people of their legal obligations and the necessity for eliminating rats, to inform them of the latest recommendations for control, and to encourage concerted action.

No accurate survey has been made of the results of the Rat and Mouse Act and National Rat Week, but E. C. Read, of the Ministry of Agriculture, estimates that the rat population was reduced 80 percent by 1930.

In his recommendations on control methods, made soon after the law was passed in 1920, the technical adviser of the Ministry emphasized rat-proofing, supplemented by poisoning with barium-carbonate or red-squill baits and by trapping and gassing. It is of interest to note the increased use of red-squill thereafter: Of the 93 firms in London selling rat poisons at that time, only 6 carried reliable red-squill; now it is almost the only poison used in England for rat control, and possibly 10 tons of the powder are used annually.

Germany

Germany has no national legislation directly on rat control, but a general law of 1900 gave the local authorities power to enact regulations for their jurisdictions. Local chambers of agriculture in that country are now actively engaged in rat suppression and, as a means of preventing waste of food, the Government is supporting the movement. Those who know German can read to advantage a recent excellent book entitled "Das Rattenbuch" (The Rat Book), by Raphael Koller, which contains a wealth of information on all phases of rat control.

Switzerland

In Switzerland, the Section of Hygiene of the League of Nations, which is compiling information on diseases throughout the world, has recently completed a study of typhus fever, a disease carried by fleas, mites, and lice infesting rats.

France

Paris has been host to the International Rat Conferences, of which two have been held, one in 1928 and the other in 1931. The purpose of the conferences was to arouse a world-wide active interest in rat control. Representatives from the leading countries met on these two occasions and heard the best authorities discuss the subject. The speeches and reports of these conferences have been published in French, and interested persons will find in them many valuable contributions to the solution of the rat problem.

Unfortunately, neither conference resulted in any definite action toward world-wide rat control. Both contributed much educationally, however, and were useful in the exchange of ideas, but that is all. Gabriel Petit, secretary of the conference, planned another along different lines for 1936, but he failed to obtain the necessary financial support.

France has no national law for the destruction of rats. A commission, however, made a study in 1920 of methods for control and recommended a bounty of 25 centimes (then about 4.8 cents) a rat. This was in effect from September 1920 to July 1921, and resulted in the destruction of 395,000 rats at a cost of 400,000 francs, or about one franc (then about 19.3 cents) each. When it was realized, however, that the number killed did not total more than 20 to 30 percent of the several million rats in Paris, the bounty was discontinued. Prof. Petit has estimated that there are 10,000,000 rats in Paris. He favors control legislation but considers it as sometimes difficult to enforce. Regarding commercial extermination, Prof. Petit believes that charges by operators are too low to assure satisfactory results.

A new kind of red-squill powder, known as "stabilactivated red-squill," has been produced in France from Algerian bulbs. The manufacturing firms claim that it has a high toxicity and will not harden or deteriorate even when stored in open sacks. Every lot is tested on large gray rats. This product is sold in France, Germany, and Holland, and plans are being made to distribute it in the United States.

METHODS IN AMERICA

The Bureau of Biological Survey has been entrusted with responsibilities in rat control on a Nation-wide scale by means of research, education, demonstration, and cooperation as a means of reducing waste in field crops and stored food products. Congress has made annual appropriations to this Bureau to conduct rodent-control work on a broad basis. No laws making the destruction of rats compulsory have been enacted.

When rats affect human health, the United States Public Health Service is empowered to destroy them at the centers of infestation. For many years that Service has supervised the fumigation of vessels arriving at our ports, and it makes periodic examinations along the waterfronts to prevent the introduction of bubonic plague and other diseases. In most communities local health officials are authorized to take action against rats when they endanger public health.

Such research in rat control has been carried on by the Bureau of Biological Survey as the funds have permitted. Prof. Lantz, who was connected with the Survey until his death in 1919, was one of the pioneers in this country in developing methods of rat control. In his first Farmers' Bulletin on the subject (No. 297), which appeared in 1907, he emphasized the need for cooperative effort, ratproofing, sanitation, and various methods of destruction, particularly by the use of barium carbonate, then considered the safest rat poison to handle. All aspects of the problem were studied by Prof. Lantz, and his findings were given to the public through demonstrations and in bulletins issued by the Bureau. Upon his death, James Silver undertook the work, and it is now being continued in the Division of Predator and Rodent Control of the Biological Survey.

In 1920, the Federal Bureau of Chemistry published a technical bulletin on the "Toxicity of Barium Carbonate to Rats," and in 1922, one on the "Relative Toxicity of Strychnine to the Rat."

In later years it was felt that the public should employ a safer poison than any of those then in common use. Experiments were begun to develop a satisfactory red-squill powder, as European preparations containing this product were not of uniformly high toxicity. After testing red-squill powders manufactured by different processes on about 10,000 rats, a satisfactory method of producing a highly efficient product was developed by the Biological Survey in 1929, and the results were published in a technical bulletin, "Red-Squill Powders as Raticides." Further investigations with the preparation are now being conducted, including the manufacturing of squill extract and isolation of the specific principle toxic to rats. The Survey is continually experimenting to develop new and improved raticides.

The educational phase of rat control has been promoted by issuing timely bulletins, news articles, and radio addresses, and making lantern slides, motion pictures, and posters available to the public. The material for these media of information is based on facts, rather than on theories. Various methods of rat destruction now in use need further study because of insufficient demonstration of their value; the use of "lures" is one example.

Although the research and educational aspects of the rat problem are of fundamental importance, the chief need is to stimulate cooperative efforts. As is well realized, a Nation-wide rat-control program is one that requires everyone's cooperation. It calls for concerted efforts by Federal, State, and local officials. Rats are roving animals and their

riddance depends on systematic efforts by communities, States, and the Nation, as well as cooperation between Nations.

In the course of its work on rats the Biological Survey has developed the "Campaign method" in many places and in various phases. Most important has been the educational emphasis, that is, focusing the attention of the public upon the need for rat control and demonstrating the possibility of cooperative control by ratproofing, destruction, and sanitation. Though supervised by the Survey, these campaigns have not been financed by the Federal Government, except some of the more recent of the emergency type under C.W.A., E.R.A., and W.P.A. funds. There have been county-wide rural campaigns, State-wide campaigns, and city campaigns, and many community undertakings. Millions of the pests have been killed at relatively low cost, and the public has been awakened to the rat menace. Requests by individuals and by organizations, both civic and governmental, for control through campaigns have been increasing.

Ultimate solution of the rat-control problem awaits a definite large-scale plan of cooperation between individuals, organizations (including manufacturers and exterminators), municipalities, counties, States, and the Federal Government. Adequate legislation and funds are essential to compulsory and regulatory features, but progress will depend to a great extent upon voluntary cooperation.